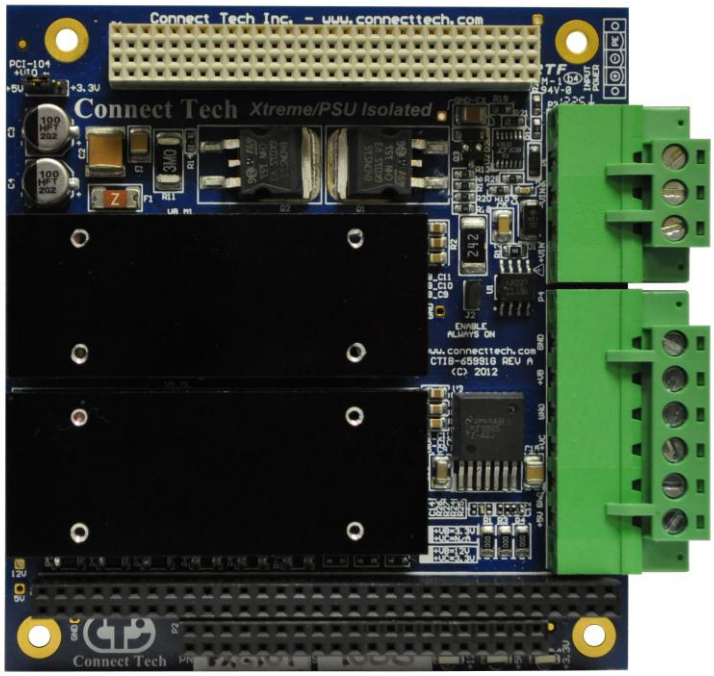
Connect Tech Inc.
Embedded Computing Experts

Xtreme/PSU Isolated
User Manual



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Revision History

Revision	Date	Change(s)
0.00	10/09/2012	Initial Manual Revision Created
0.01	12/10/2012	Additional Rise-Time and Switching Frequency data added
0.02	05/02/2013	Updated Pinout Diagrams and Tables
0.03	08/07/2013	Updated Ripple and Noise Details

Customer Support Overview

If you experience difficulties after reading the manual and/or using the product, contact the Connect Tech Inc. reseller from which you purchased the product. In most cases the reseller can help you with product installation and difficulties.

In the event that the reseller is unable to resolve your problem, our highly qualified support staff can assist you. Our support section is available 24 hours a day, 7 days a week on our website at: www.connecttech.com/sub/support/support.asp. See the contact information section below for more information on how to contact us directly. Our technical support is always free.

Contact Information

We offer three ways for you to contact us:

Mail/Courier

You may contact us by letter at:

Connect Tech Inc.
Technical Support
42 Arrow Road, Guelph, ON
Canada N1K 1S6

Email/Internet

You may contact us through the Internet. Our email and URL addresses on the Internet are:
sales@connecttech.com
support@connecttech.com
www.connecttech.com

Note:
Please go to the **Download Zone** or the **Knowledge Database** in the **Support Center** on the Connect Tech Inc. website for product manuals, installation guides, device driver software and technical tips. Submit your technical support questions to our customer support engineers via the **Support Center** on the Connect Tech Inc. website.

Telephone/Facsimile

Technical Support representatives are ready to answer your call Monday through Friday, from 8:30 a.m. to 5:00 p.m. Eastern Standard Time. Our numbers for calls are:

Telephone:	800-426-8979 (North America only)
Telephone:	519-836-1291 (Live assistance available 8:30 a.m. to 5:00 p.m. EST, Monday to Friday)
Facsimile:	519-836-4878 (online 24 hours)

Introduction

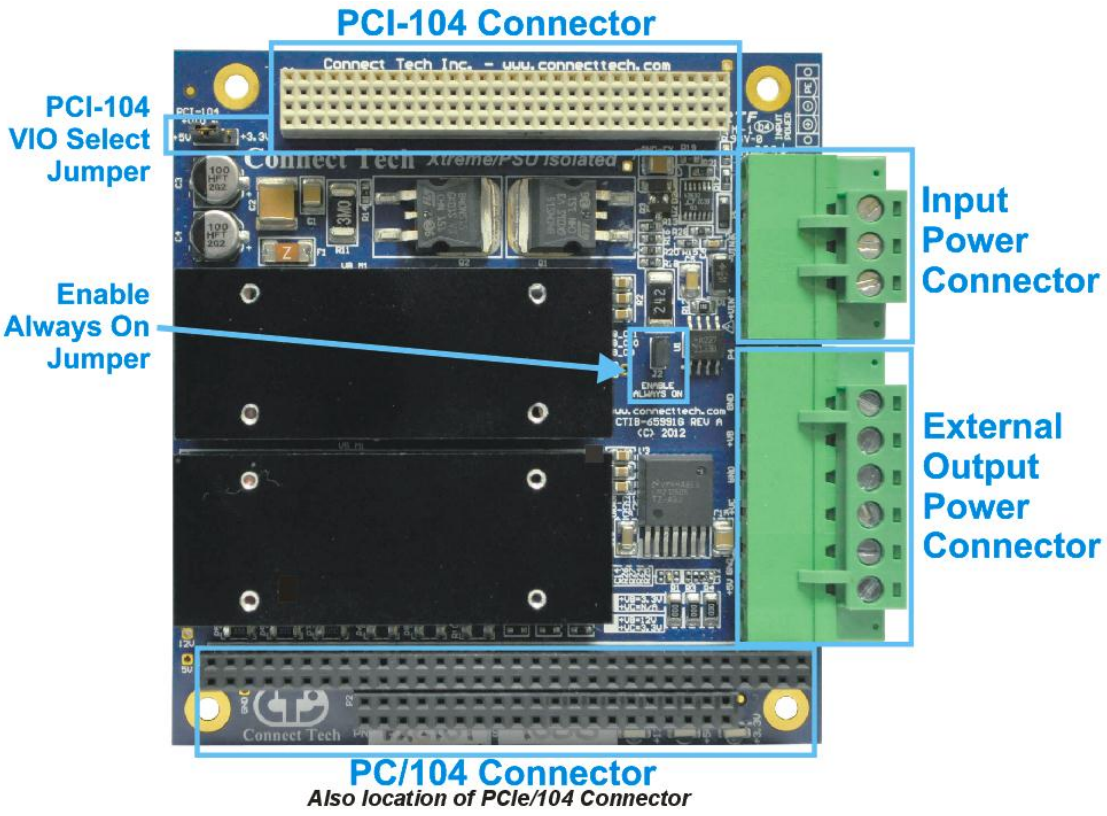
Connect Tech's Xtreme/PSU Isolated power supply is a high efficiency, high powered Isolated PC/104 form factor power supply with extended temperature capabilities. Xtreme/PSU Isolated provides isolated power to on-board terminal block connectors and also directly powers all of the PC/104 family expansion buses such as PC/104, PC/104-Plus, PCI-104, PCI/104-Express and PCIe/104. The Xtreme/PSU Isolated is a highly reliable power supply which provides up to 195W of total output power with +3.3V, +5V, and +12V output voltages. It can be used as a stand-alone power supply to power any other embedded system, or used directly to power any PC/104 stack or single board computer (SBC). The Xtreme/PSU Isolated power supply has a wide input voltage range that accepts +9V to +36V DC and is specifically designed for use in a broad range of rugged applications including military, industrial, and air and ground vehicles. Xtreme/PSU Isolated power supply can be used in combination with Connect Tech's stackable CPU and expansion boards for a total design solution.

Detailed Technical Specifications

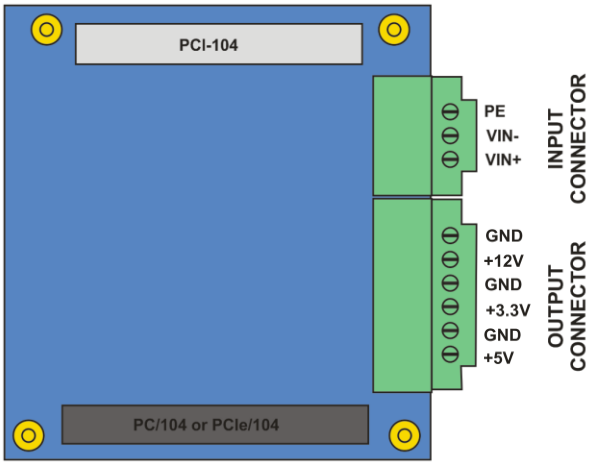
Specification	Details
Dimensions	• 3.550" x 3.775" (90mm x 96) PC/104 Compliant • Download 3D Model Files (Click Here) - .step model files
Input Voltage Range	• +9V to +36V DC • Advanced input protection from spikes, surges, noise, over-voltage and over-current.
Isolation	• Up to 2.25kV of galvanic isolation • Output power and GND completely isolated from input power • All PC/104 rail power is also isolated from input power
+5V Output	• Up to 15A maximum • 1% Output regulation accuracy • PXG10X/20X: <125mV p-p ripple/noise at full load. PXG30X: <150mV • Output Current Limiting Protection • Output Overvoltage Protection • Remote ON/OFF control • Switching Frequency: 235kHz
+12V Output	• Up to 10A maximum • 1% Output regulation accuracy • PXG10X: <125mV p-p ripple/noise at full load. PXG30X: <150mV • Output Current Limiting Protection • Output Overvoltage Protection • Remote ON/OFF control • Switching Frequency: 275kHz
+3.3V	• Up to 20A maximum • 1% Output regulation accuracy • <80mV p-p ripple/noise at full load. (all series) • Output Current Limiting Protection • Output Overvoltage Protection • Remote ON/OFF control • Switching Frequency: 250kHz
Operating Temperature	• -40 to +85 Degrees Celsius • See derating section for full details on current consumption vs. input voltage.
Warranty and Support	• Lifetime Warranty • Free Technical Support

Board Diagrams

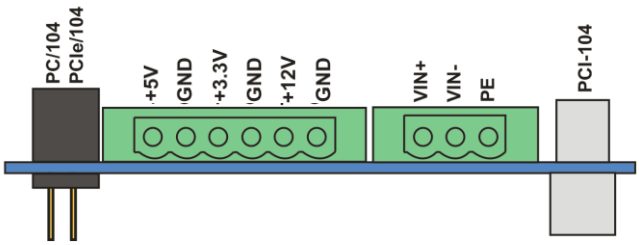
Board Photo



Top View

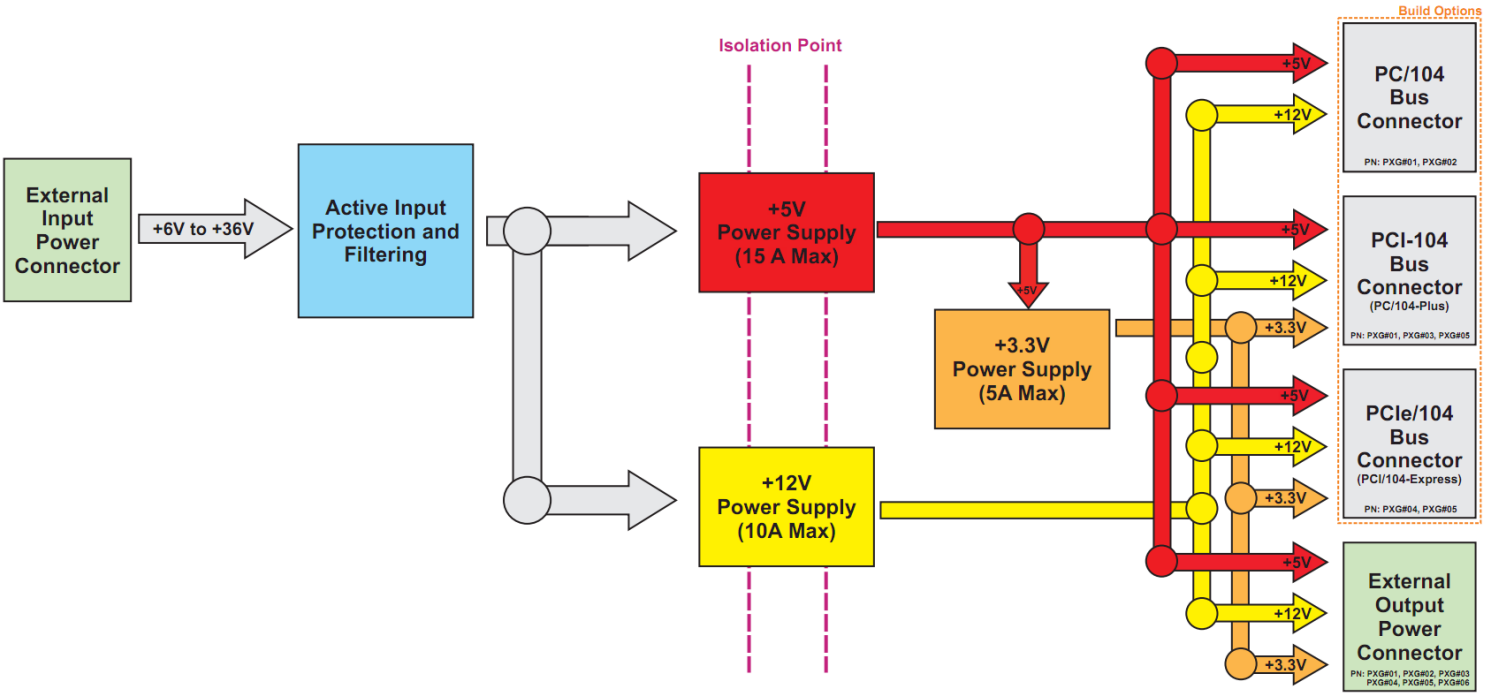


Side View



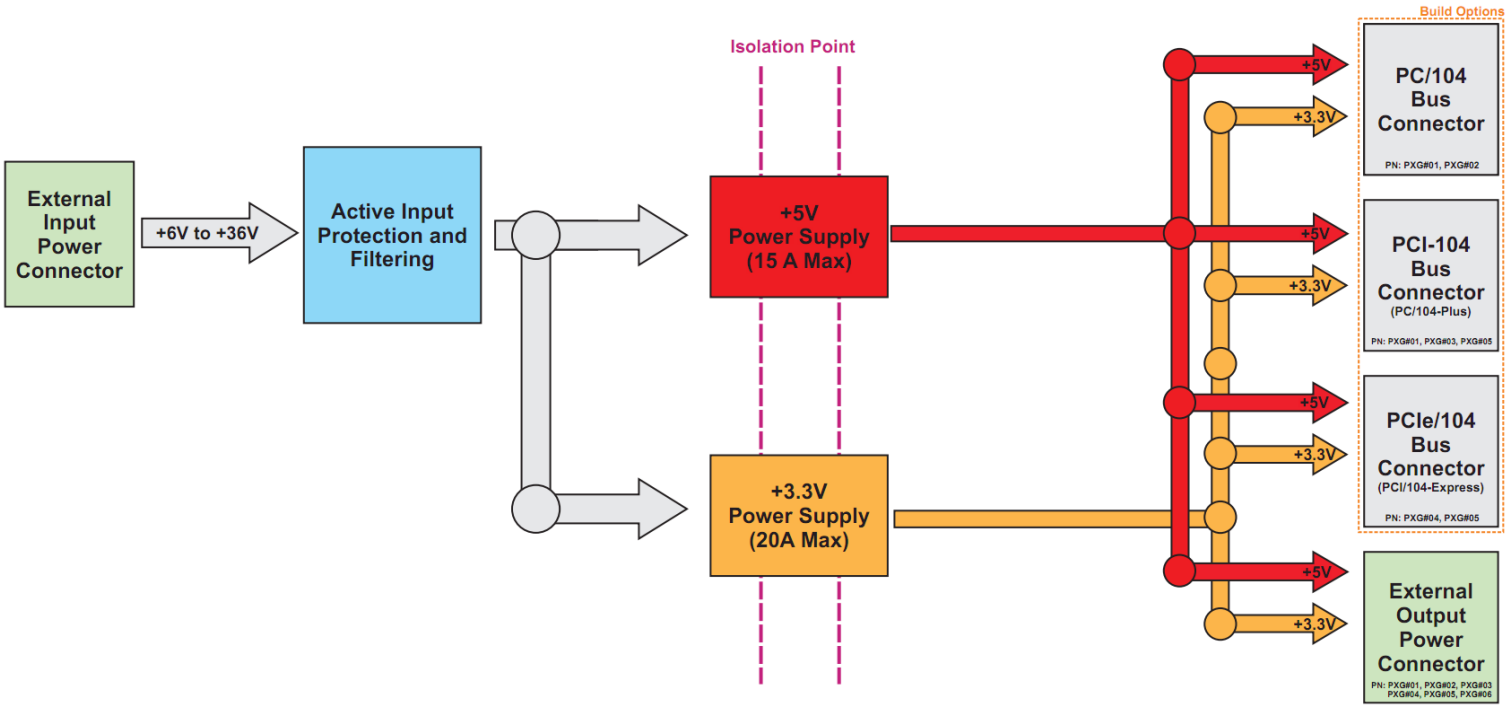
Functional Block Diagram (SP & HP Models)

Part Numbers: PXG10# and PXG30#

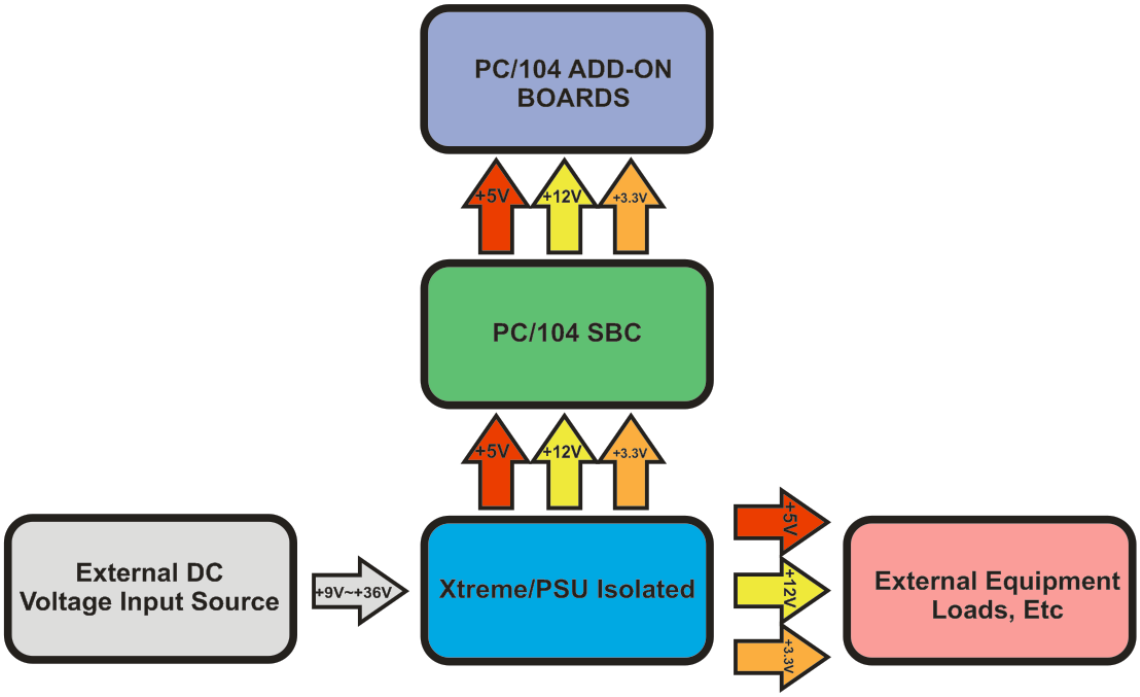


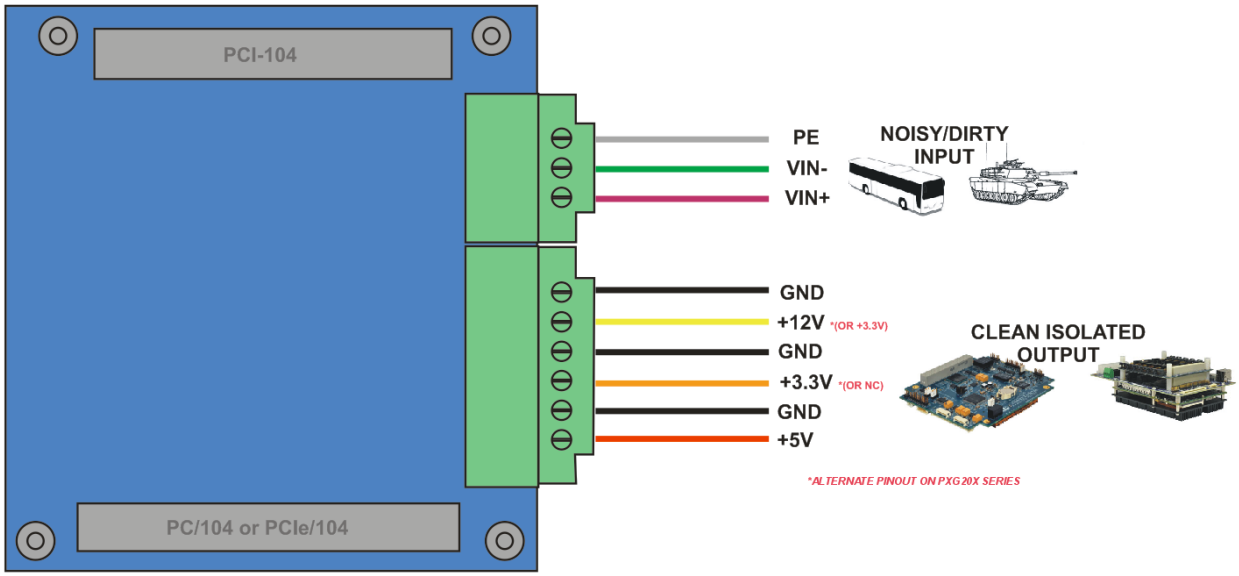
Functional Block Diagram (LP Model)

Part Numbers: PXG20#



Example Useage Block Diagram





Part Number Information

Below is table with a listing of available parts numbers for Xtreme/PSU Isolated family.

Part Number	Series	+5V Power	+12V Power	+3.3V Power	Bus Connectors
PXG101	SP	15A	6A	5A	PC/104-Plus
PXG102	SP	15A	6A	5A	PC/104
PXG103	SP	15A	6A	5A	PCI-104
PXG104	SP	15A	6A	5A	PCIe/104
PXG105	SP	15A	6A	5A	PCI/104-Express
PXG106	SP	15A	6A	5A	None Installed
PXG107	SP	15A	6A	-	PC/104-Plus
PXG108	SP	15A	6A	-	PC/104
PXG109	SP	15A	6A	-	PCI-104
PXG110	SP	15A	6A	-	PCIe/104
PXG111	SP	15A	6A	-	PCI/104-Express
PXG112	SP	15A	6A	-	None Installed
PXG201	LP	15A	-	20A	PC/104-Plus
PXG202	LP	15A	-	20A	PC/104
PXG203	LP	15A	-	20A	PCI-104
PXG204	LP	15A	-	20A	PCIe/104
PXG205	LP	15A	-	20A	PCI/104-Express
PXG206	LP	15A	-	20A	None Installed
PXG301	HP	15A	10A	5A	PC/104-Plus
PXG302	HP	15A	10A	5A	PC/104
PXG303	HP	15A	10A	5A	PCI-104
PXG304	HP	15A	10A	5A	PCIe/104
PXG305	HP	15A	10A	5A	PCI/104-Express
PXG306	HP	15A	10A	5A	None Installed
PXG307	HP	15A	10A	-	PC/104-Plus
PXG308	HP	15A	10A	-	PC/104
PXG309	HP	15A	10A	-	PCI-104
PXG310	HP	15A	10A	-	PCIe/104
PXG311	HP	15A	10A	-	PCI/104-Express
PXG312	HP	15A	10A	-	None Installed

To order any of these part numbers or to inquire about the other available ordering options please contact sales@connecttech.com for further information.

Hardware Installation

The *Xtreme/PSU Isolated* can be installed into a PC/104 type stack to provide power to the stack through its bus connectors or external power connector. The Xtreme/PSU can also be used as a stand-alone embedded power supply to provide power to any other piece of equipment of embedded SBC.

To install the Xtreme/PSU in your system please follow these steps:

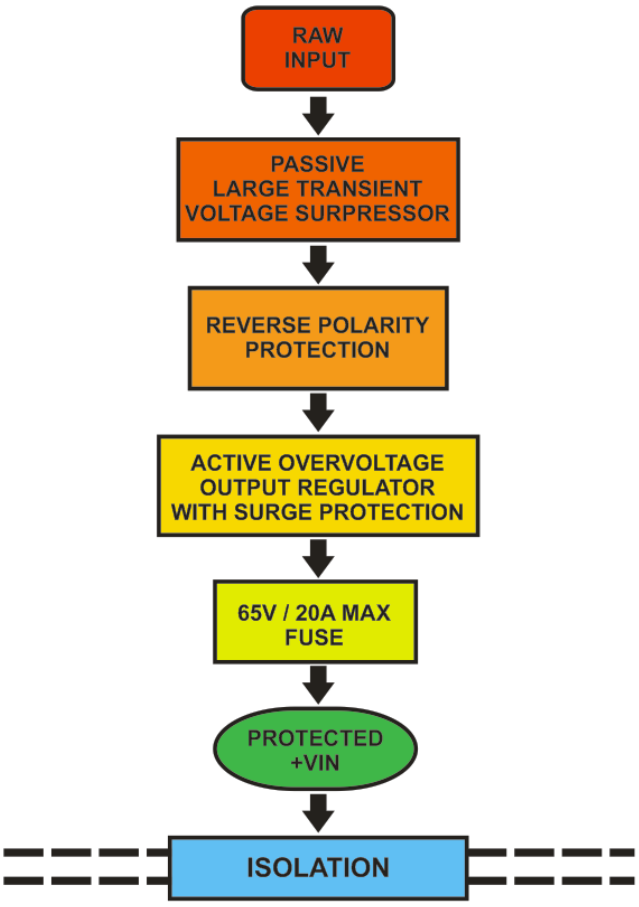
1. Ensure your DC input power is OFF (+9V to +36V).
2. Install standoffs into system.
3. Insert Xtreme/PSU onto stack (bottom, middle or top) connecting its bus connectors to PC/104, PCI-104, or PCIe/104.
4. Ensure board is bolted/screwed into stack.
5. Install the appropriate Jumpers on the Xtreme/PSU. (If the PE input pin is NOT used, ensure that the "Enable Always On" Jumper IS installed.
6. Connect any external power connections to the Xtreme/PSU's External Power Connector.
7. Connect input power connection to the Xtreme/PSU's Input Power Connector.
8. Power on input power to power up the system.

Input Power

The Xtreme/PSU Isolated is meant to use any DC input power source in the rage of **+9V to +36V DC**, which is ideal for many vehicle or mobile application, but also many industrial power solutions as well. This input power source will be galvanically isolated from the output rails and free from any noise present on the input side.

Input Power Diagram

Below is diagram of the flow of the input power on the Xtreme/PSU Isolated. The input power goes through many protection, safety and isolation components before connecting to the output power supplies.



Active Input Power Protection Details

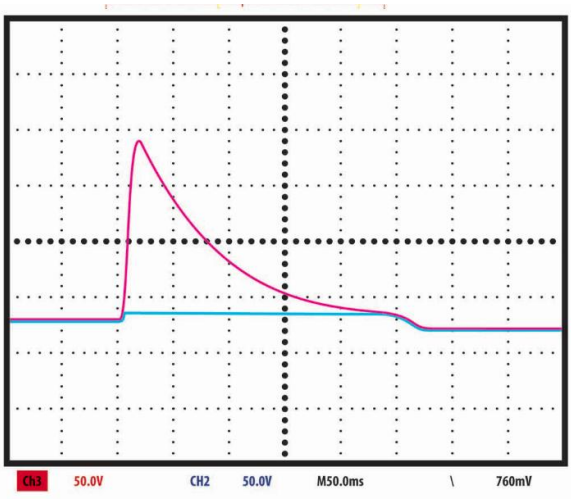
The main benefit to using the Xtreme/PSU Isolated protects loads from high voltage input transients. It regulates the output during an overvoltage event, such as load dump in vehicles, by controlling the gate of an external N-channel MOSFET. The output is limited to a safe value allowing the loads to continue functioning.

The Xtreme/PSU Isolated also monitors the voltage drop to protect against overcurrent faults. In either fault condition, a timer is started inversely proportional to MOSFET stress. If a fault condition persists, the supply is turned off.

Two precision comparators monitor the input supply for overvoltage (OV) and undervoltage (UV) conditions. When the potential is below the UV threshold, the external MOSFET is kept off. If the input supply voltage is above the OV threshold, the MOSFET is not allowed to turn back on. Back-to-back MOSFETs are used for reverse input protection, reducing voltage drop and power loss.

This input power protection is ideal for applications such as:

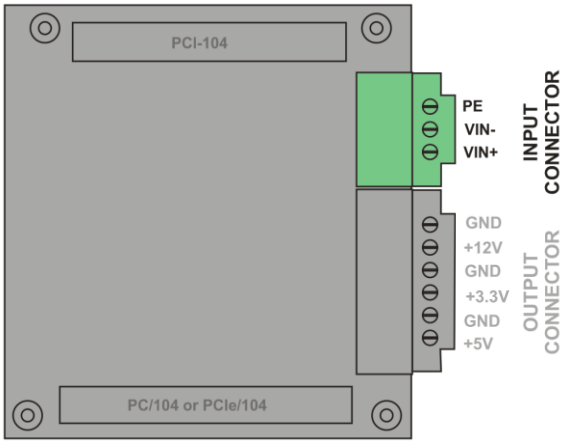
- Automotive/Avionic Surge Protection
- Hot Swap/Live Insertion
- Intrinsic Safety Applications



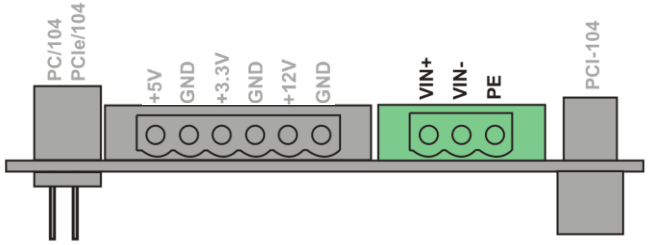
Pink Trace: Incoming Transient
Blue Trace: Output protected Power

Input Power Connector Pinout

Top View



Side View



Pin Descriptions

Pin	Details
1 – VIN+	Positive Input Terminal. • Connect this pin to your main input power source
2 – VIN-	Negative Input Terminal. • Connect this pin to your input power source ground/return connection
3 – PE	Power Enable • This pin can be used to remotely turn ON or OFF the Xtreme/PSU Isolated

Input Connector

The input power connector on the Xtreme/PSU Isolated is a standard 3-pin 5mm pitch terminal block connector that mates to a shrouded 5mm screw terminal plug. With your purchase of the Xtreme/PSU you will have received a mating plug connector, below is a list of plug part numbers that are compatible with the PSG.

Input Power Connector Plug Compatible Part Numbers

Part Number: 20020003-G031B01LF	Manufacturer: FCI
Part Number: 796858-3	Manufacturer: TE Connectivity
Part Number: 1835481	Manufacturer: Phoenix Contact
Part Number: OSTVM037552	Manufacturer: On Shore Technology Inc

Power Enable (PE) Pin Functionality / Remote ON/OFF

The PE (Power Enable) pin is an isolated active high input pin that can be used to turn the *Xtreme/PSU Isolated's* output rails ON or OFF. This can be useful for a connection to an outside external logic source or vehicle ignition sense line. Driving the PE pin to a voltage greater than +9V and less than +36V will turn ON the isolated voltage outputs. Driving the PE pin to ~0V will disable and turn OFF all of the isolated output voltages.

It is important to note that the PE pin is on the NON-Isolated side of the power supply and should not be driven or connected to any isolated (clean) sources.

Enable Always On Jumper

When remote ON/OFF functionality is NOT needed, simply install the J2 jumper and the *Xtreme/PSU Isolated* will always turn ON it's isolated output rails whenever power is applied to the VIN+/VIN- terminals.

Output Power

The Xtreme/PSU is meant to use any DC input power source in the rage of +6V to +36V DC, which is ideal for many vehicle or mobile application, but also many industrial power solutions as well.

Technical Specifications
The *Xtreme/PSU Isolated* outputs 3 main voltage rails:

- +5V @ up to 10A
- +12V @ up to 10A
- +3.3V @ up to 20A

All outputs provide:

- Current Limiting Protection
- Overvoltage Protection
- Remote ON/OFF control

Detailed graphs/charts on output power be found in the ***Detailed Specifications and Graphs*** section of this manual.

Below is a breakdown of the various output power series available, please refer to the Part Number Information section to see a complete breakdown by orderable part number.

Power Series Options	LP	SP	HP
Input Voltage Range	+9V to +36V DC	+9V to +36V DC	+18V to + 36V DC
Isolation Rating	1.5kV	1.5kV	2.25kV
+3.3V Output Current	20A	5A	5A
+5V Output Current	15A	15A*	15A*
+12V Output Current	-	6A	10A
Total Power	141W	147W	195W
* SP & HP +3.3V rail is derived from the +5V rail			

Output Connector

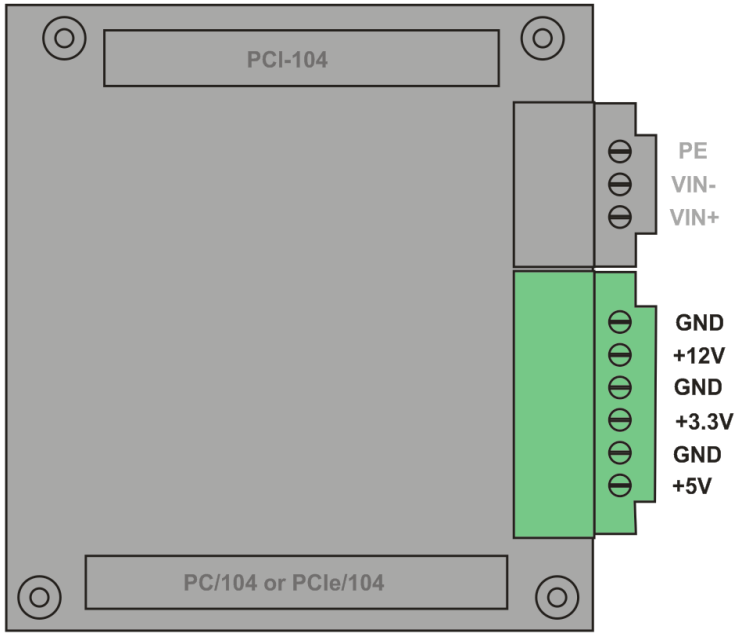
The input power connector on the Xtreme/PSU Isolated is a standard 3-pin 5mm pitch terminal block connector that mates to a shrouded 5mm screw terminal plug. With your purchase of the Xtreme/PSU you will have received a mating plug connector, below is a list of plug part numbers that are compatible.

Input Power Connector Plug Compatible Part Numbers

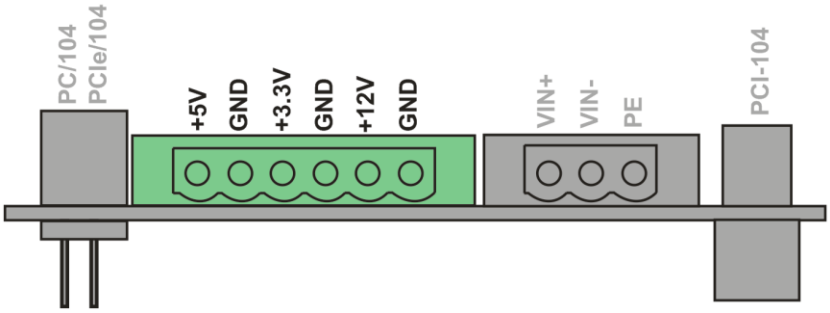
Part Number: 20020003-G061B01LF	Manufacturer: FCI
Part Number: 796858-6	Manufacturer: TE Connectivity
Part Number: 1835481	Manufacturer: Phoenix Contact
Part Number: OSTVM067552	Manufacturer: On Shore Technology Inc

Output Power Connector Pinout (SP PXG10# & HP PXG30# models only)

Top View



Side View

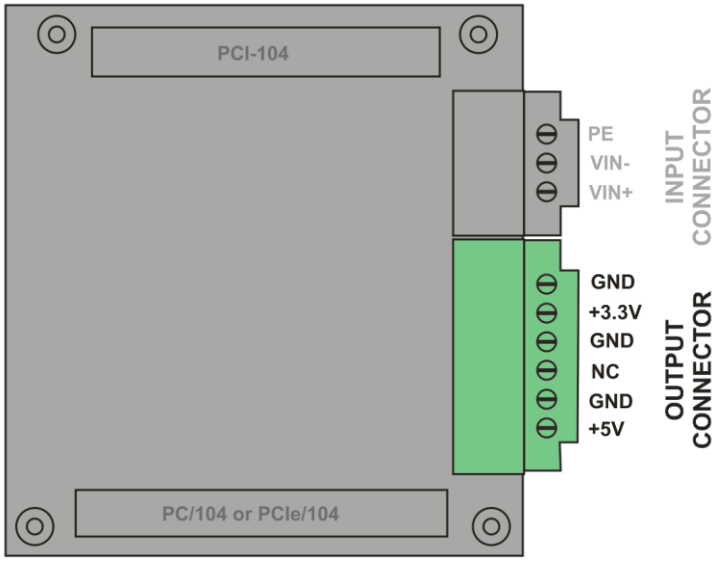


Pin Descriptions

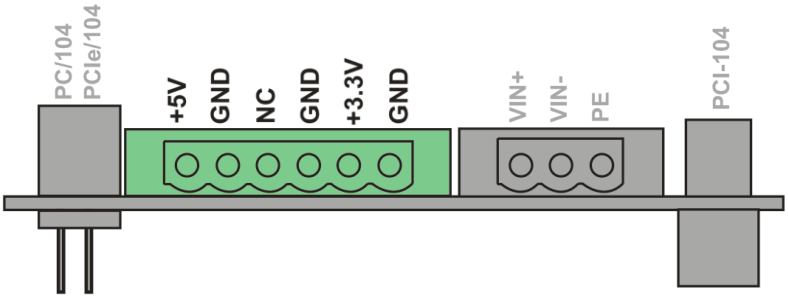
Pin	Details
1 – +5V	+5V Output Pin
2 – GND	Ground Pin
3 – +3.3V	+3.3V Output Pin
4- GND	Ground Pin
5 - +12V	+12V Output Pin
6 - GND	Ground Pin

Output Power Connector Pinout (LP PXG20# models only)

Top View



Side View



Pin Descriptions

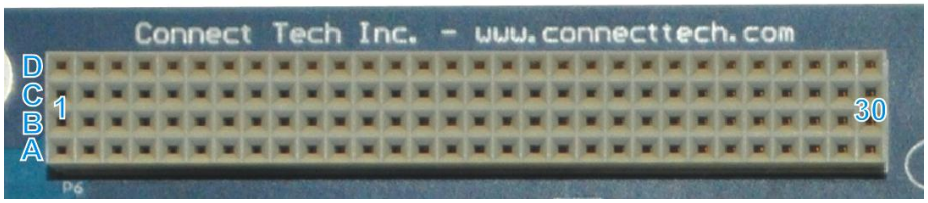
Pin	Details
1 – +5V	+5V Output Pin
2 – GND	Ground Pin
3 – +3.3V	+3.3V Output Pin
4- GND	Ground Pin
5 - NC	No Connect Pin (No output here)
6 - GND	Ground Pin

PC/104 Bus Connectors Information

PCI-104 Connector Pinout

Connector P6 is connects to the PCI-104 bus, a full listing of the pinout of the connector is found in the table below. All connected power rails are shown as well in the table below, any listed "NC" pin will be just a straight pass-through connection, with no on-board connection.

Connector Location and Pin Orientation



Pinout Table

Pin	A	B	C	D
1	GND	NC	+5V	NC
2	VIO*	NC	NC	+5V
3	NC	GND	NC	NC
4	NC	NC	GND	NC
5	GND	NC	NC	GND
6	NC	VIO*	NC	NC
7	NC	NC	GND	NC
8	+3.3V	NC	NC	+3.3V
9	NC	GND	NC	NC
10	GND	NC	NC	NC
11	NC	+3.3V	NC	GND
12	+3.3V	NC	GND	NC
13	NC	GND	NC	+3.3V
14	GND	NC	+3.3V	NC
15	NC	NC	NC	GND
16	NC	NC	GND	NC
17	+3.3V	NC	NC	+3.3V
18	NC	GND	NC	NC
19	NC	NC	VIO*	NC
20	GND	NC	NC	GND
21	NC	+5V	NC	NC
22	+5V	NC	GND	NC
23	NC	GND	NC	VIO*
24	GND	NC	+5V	NC
25	NC	VIO*	NC	GND
26	+5V	NC	GND	NC
27	NC	+5V	NC	GND
28	GND	NC	+5V	NC
29	+12V	NC	NC	NC
30	NC	NC	NC	GND

VIO*	= Can be set to +5V via on board jumper
NC**	= +3.3V is NOT provided to the bus

PC/104 Pinout

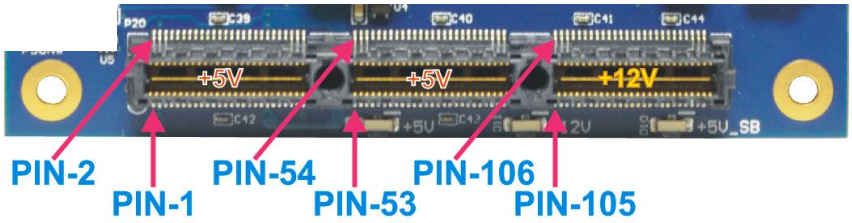
Connector Location and Pin Orientation

Pinout Table

Pin	A	B	C	D
1	NC	GND	NC	GND
2	NC	NC	NC	NC
3	NC	+5V	NC	NC
4	NC	NC	NC	NC
5	NC	NC	NC	NC
6	NC	NC	NC	NC
7	NC	NC	NC	NC
8	NC	NC	NC	NC
9	NC	+12V	NC	NC
10	NC	NC	NC	NC
11	NC	NC	NC	NC
12	NC	NC	NC	NC
13	NC	NC	NC	NC
14	NC	NC	NC	NC
15	NC	NC	NC	NC
16	NC	NC	NC	NC
17	NC	NC	NC	+5V
18	NC	NC	NC	NC
19	NC	NC	NC	GND
20	NC	NC	KEY	GND
21	NC	NC		
22	NC	NC		
23	NC	NC		
24	NC	NC		
25	NC	NC		
26	NC	NC		
27	NC	NC		
28	NC	NC		
29	NC	+5V		
30	NC	NC		
31	NC	GND		
32	GND	GND		

PCIe/104 (PCI/104-Express Pinout)

Connector Location and Pin Orientation



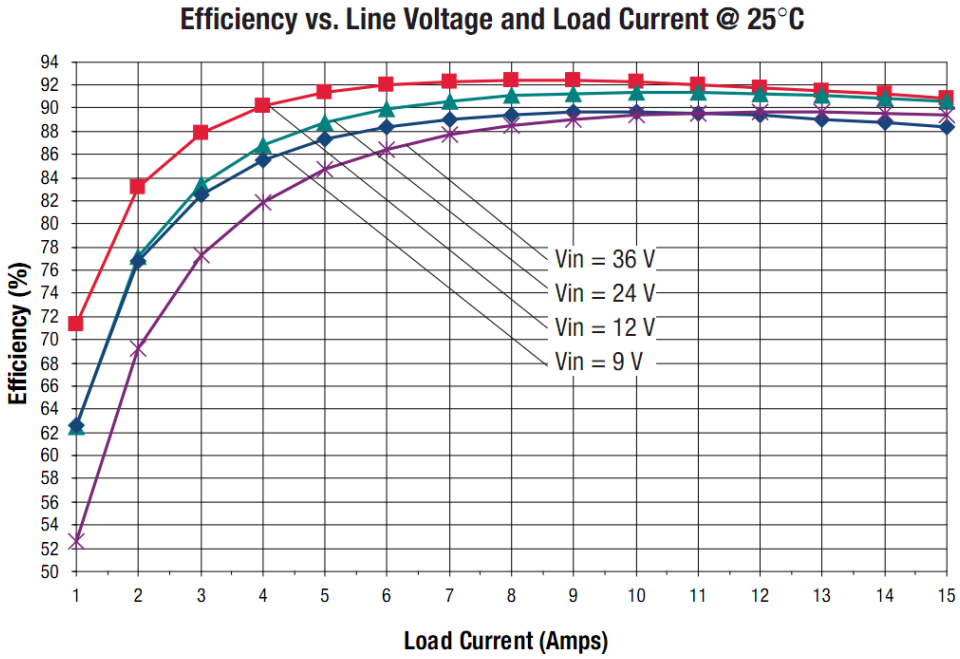
Pinout Table

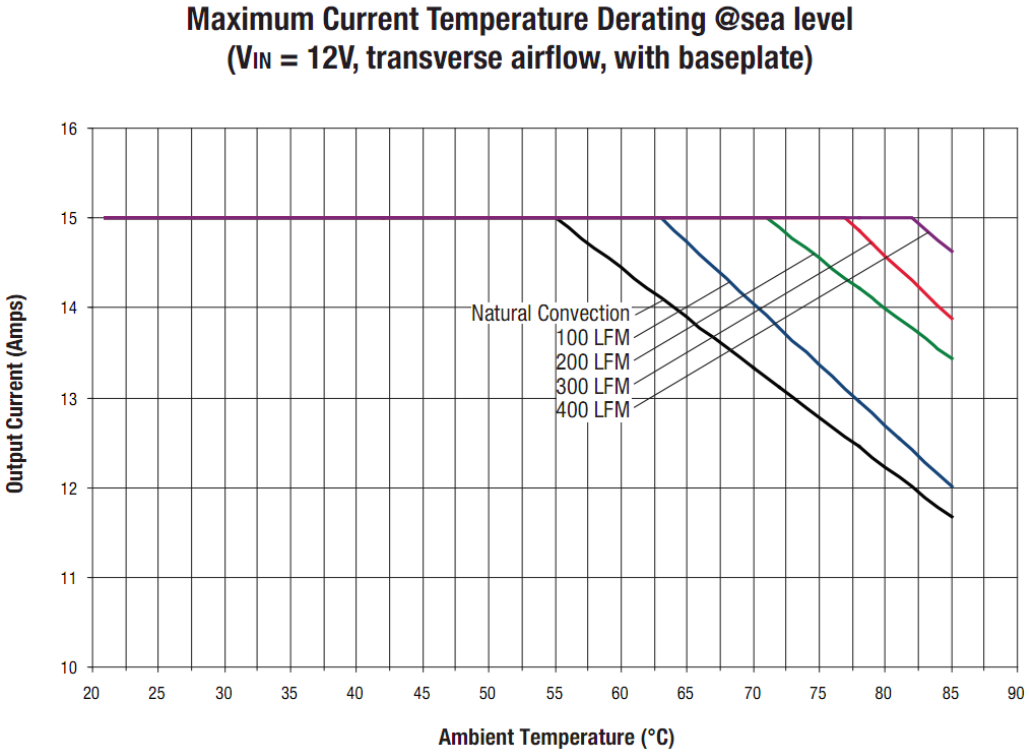
1	NC	+5V	NC	2
3	+3.3V		+3.3V	4
5	NC		NC	6
7	NC		NC	8
9	GND		GND	10
11	NC		NC	12
13	NC		NC	14
15	GND		GND	16
17	NC		NC	18
19	NC		NC	20
21	GND		GND	22
23	NC		NC	24
25	NC		NC	26
27	GND		GND	28
29	NC		NC	30
31	NC		NC	32
33	GND		GND	34
35	NC		NC	36
37	NC		NC	38
39	+5V_SB		+5V_SB	40
41	NC		NC	42
43	NC		NC	44
45	NC		PWRGOOD	46
47	NC		NC	48
49	NC		NC	50
51	NC		PSON#	52
53	NC	+5V	NC	54
55	GND		GND	56
57	NC		NC	58
59	NC		NC	60
61	GND		GND	62
63	NC		NC	64
65	NC		NC	66
67	GND		GND	68
69	NC		NC	70
71	NC		NC	72
73	GND		GND	74
75	NC		NC	76
77	NC		NC	78
79	GND		GND	80
81	NC		NC	82
83	NC		NC	84
85	GND		GND	86
87	NC		NC	88
89	NC		NC	90
91	GND		GND	92
93	NC		NC	94
95	NC		NC	96
97	GND		GND	98
99	NC		NC	100
101	NC		NC	102
103	GND		GND	104
105	NC	+12V	NC	106
107	GND		GND	108
109	NC		NC	110
111	NC		NC	112
113	GND		GND	114
115	NC		NC	116
117	NC		NC	118
119	GND		GND	120
121	NC		NC	122
123	NC		NC	124
125	GND		GND	126
127	NC		NC	128
129	NC		NC	130
131	GND		GND	132
133	NC		NC	134
135	NC		NC	136
137	GND		GND	138
139	NC		NC	140
141	NC		NC	142
143	GND		GND	144
145	NC		NC	146
147	NC		NC	148
149	GND		GND	150
151	NC		NC	152
153	NC		NC	154
155	GND		GND	156

Deratings Graphs

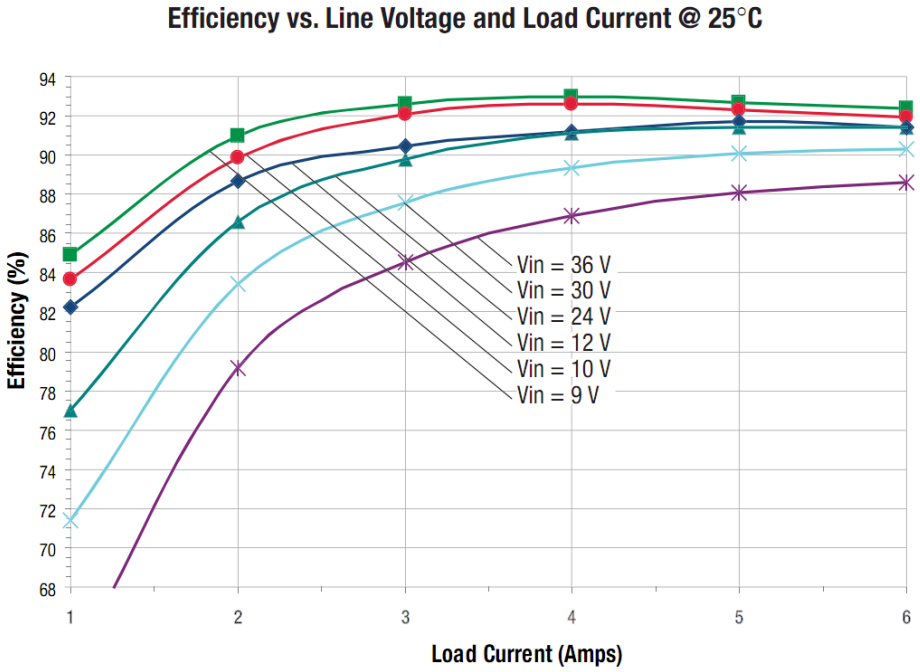
SP Series - PXG10X

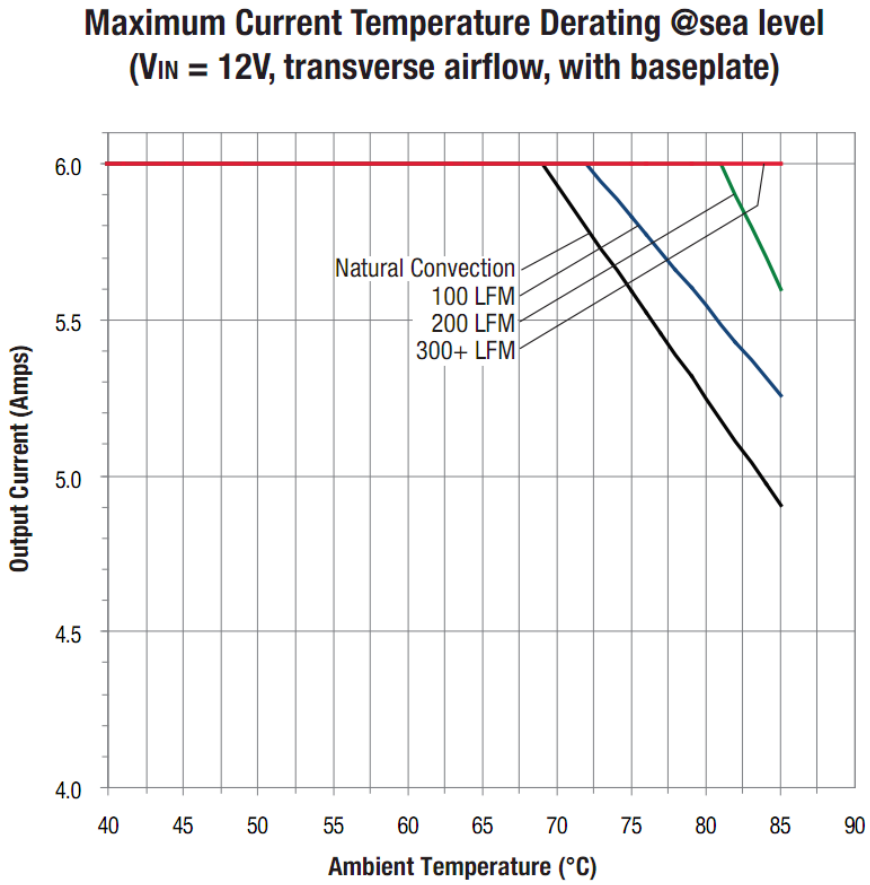
+5V Output



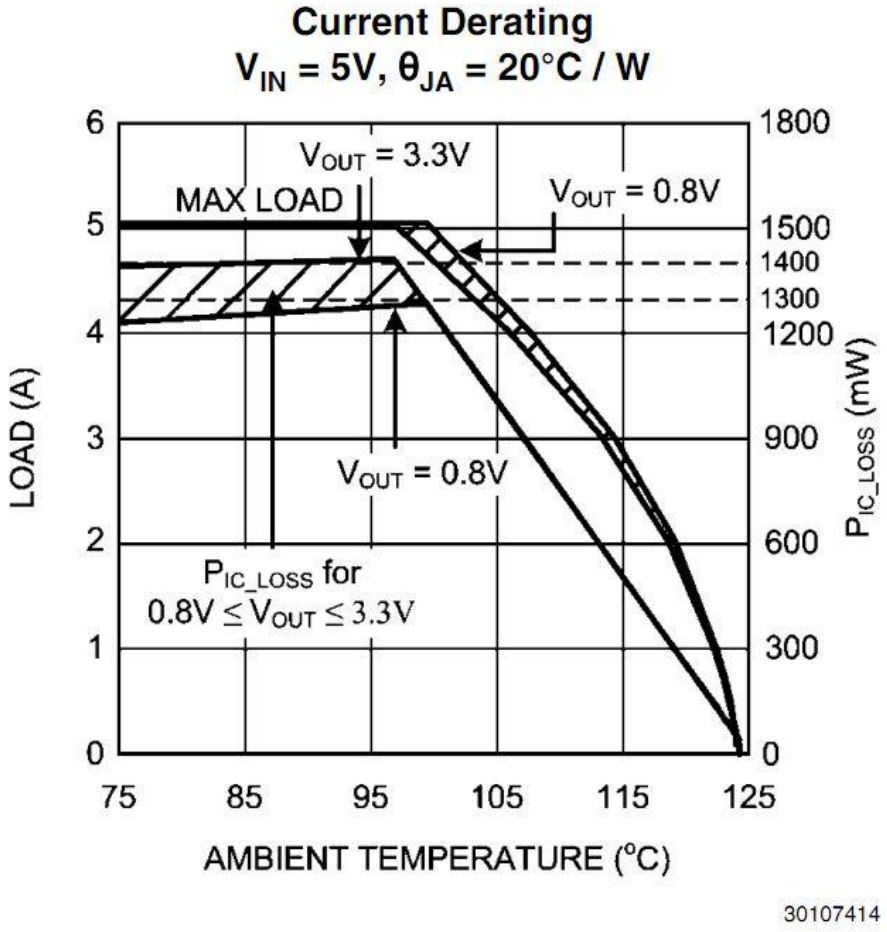


+12V Output


Efficiency vs. Line Voltage and Load Current @ 25°C
Efficiency (%)
94
92
90
88
86
84
82
80
78
76
74
72
70
68
1
2
3
4
5
6
Load Current (Amps)
Vin = 36 V
Vin = 30 V
Vin = 24 V
Vin = 12 V
Vin = 10 V
Vin = 9 V

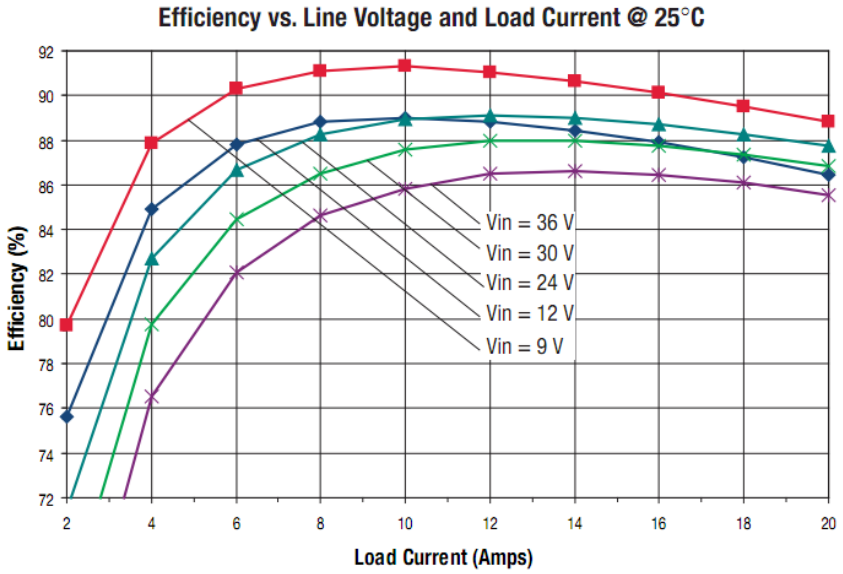

Maximum Current Temperature Derating @sea level
(VIN = 12V, transverse airflow, with baseplate)
Output Current (Amps)
6.0
5.5
5.0
4.5
4.0
40
45
50
55
60
65
70
75
80
85
90
Ambient Temperature (°C)
Natural Convection
100 LFM
200 LFM
300+ LFM

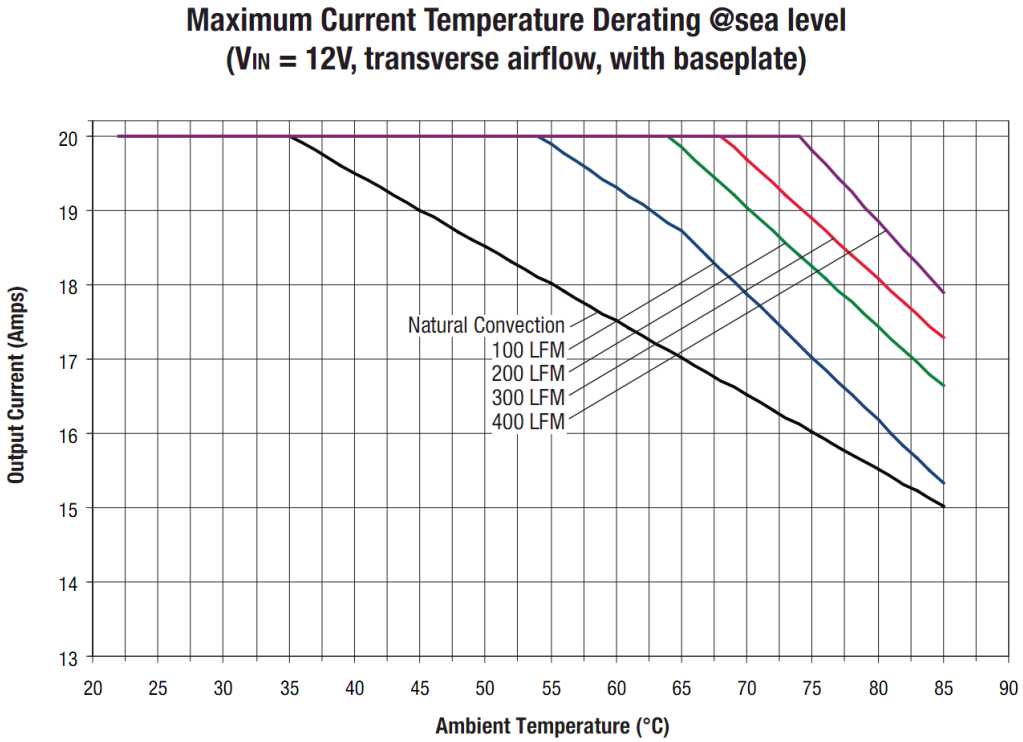
+3.3V Output (Also used for HP series)



LP Series – (PXG20X)

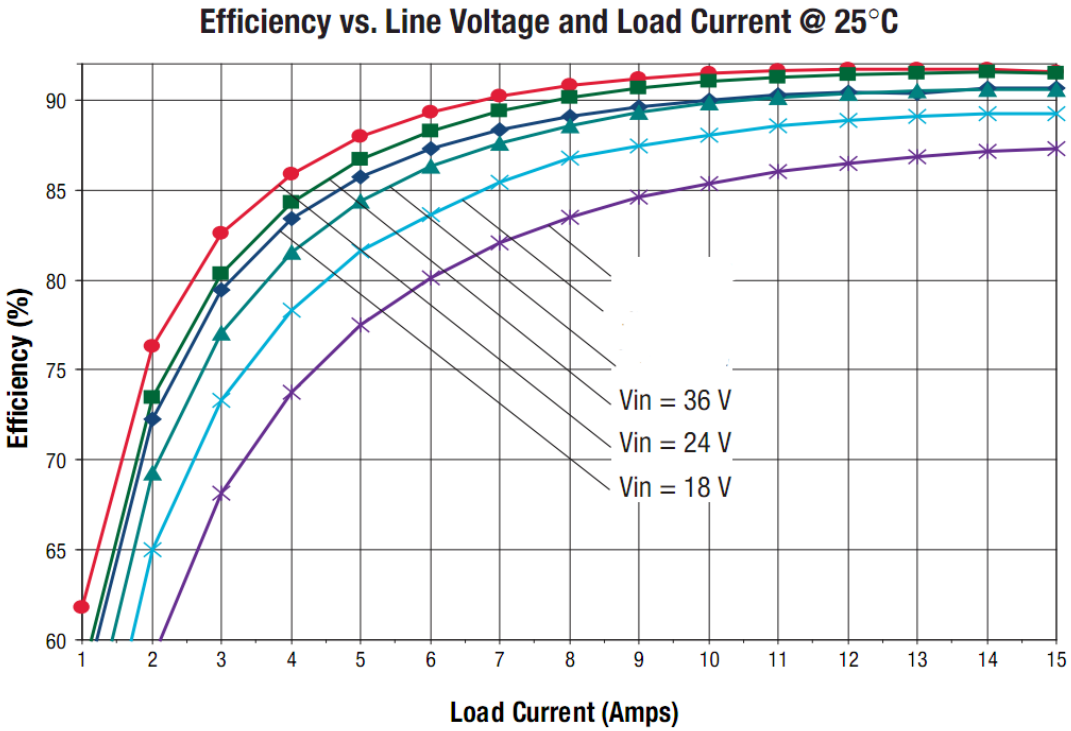
+3.3V Output

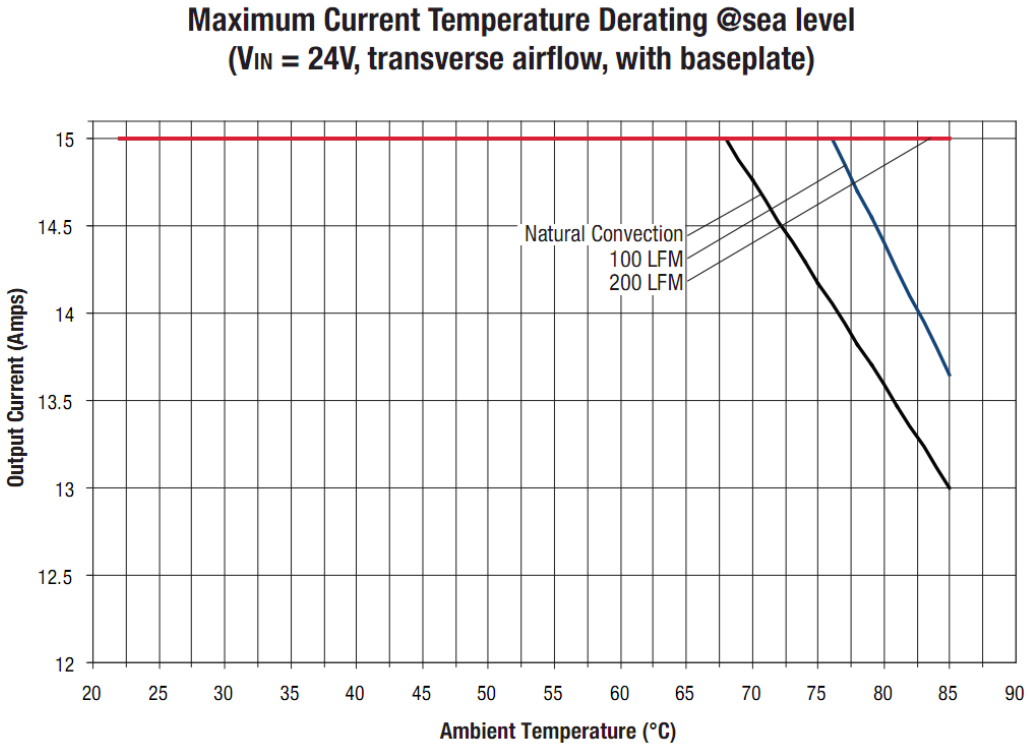




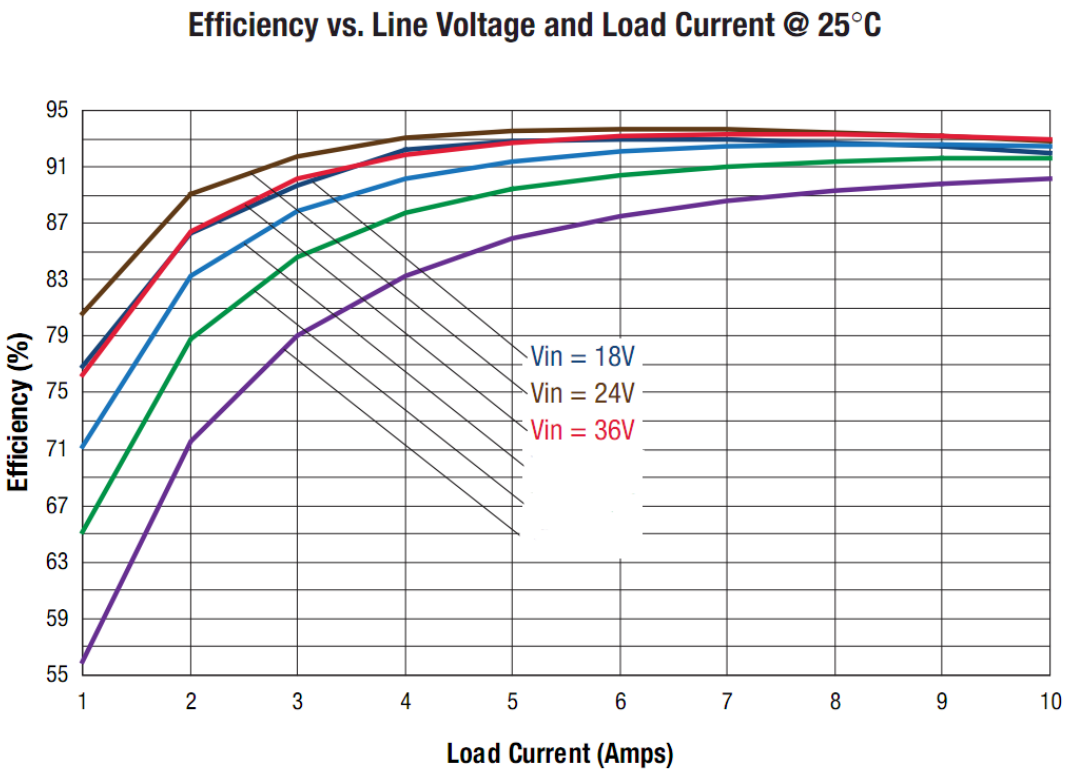
HP Series – PXG30X

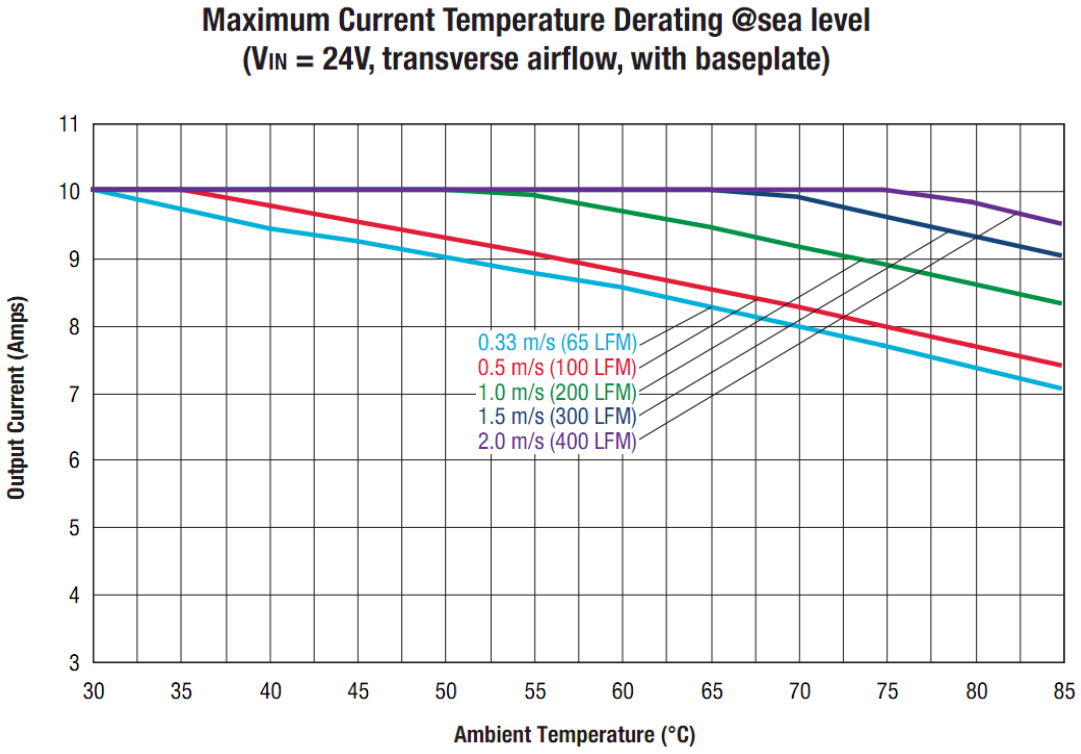
+5V Output





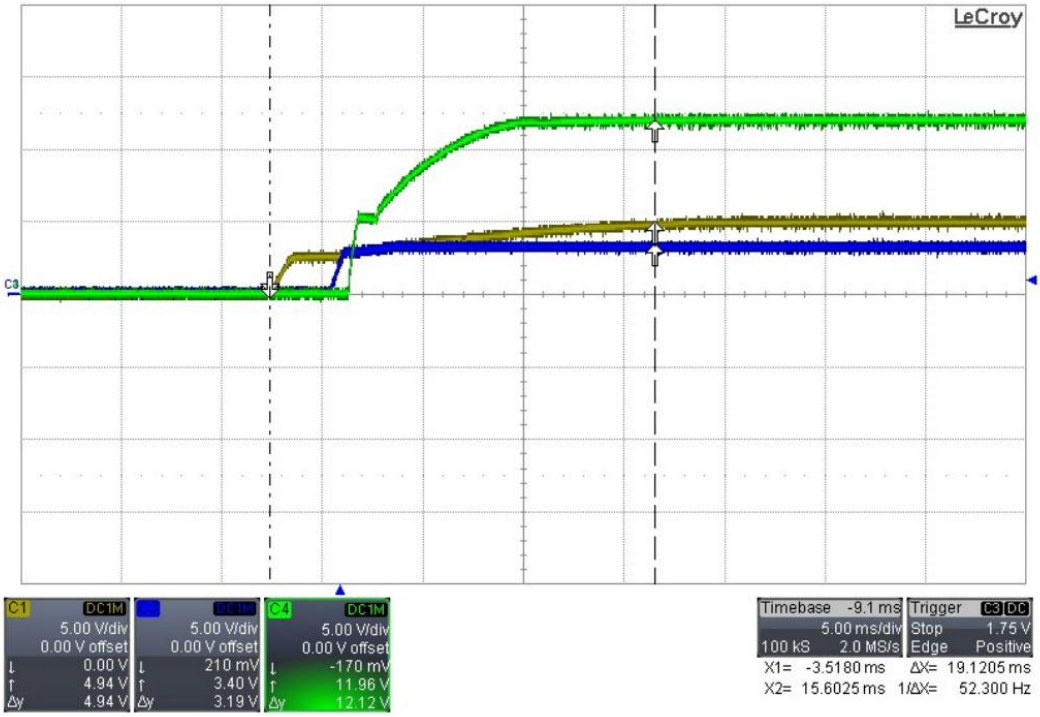
+12V Output


Efficiency vs. Line Voltage and Load Current @ 25°C
Efficiency (%)
95
91
87
83
79
75
71
67
63
59
55
1
2
3
4
5
6
7
8
9
10
Load Current (Amps)
Vin = 18V
Vin = 24V
Vin = 36V


Maximum Current Temperature Derating @sea level
(VIN = 24V, transverse airflow, with baseplate)
Output Current (Amps)
11
10
9
8
7
6
5
4
3
30
35
40
45
50
55
60
65
70
75
80
85
Ambient Temperature (°C)
0.33 m/s (65 LFM)
0.5 m/s (100 LFM)
1.0 m/s (200 LFM)
1.5 m/s (300 LFM)
2.0 m/s (400 LFM)

Rise-Time Details

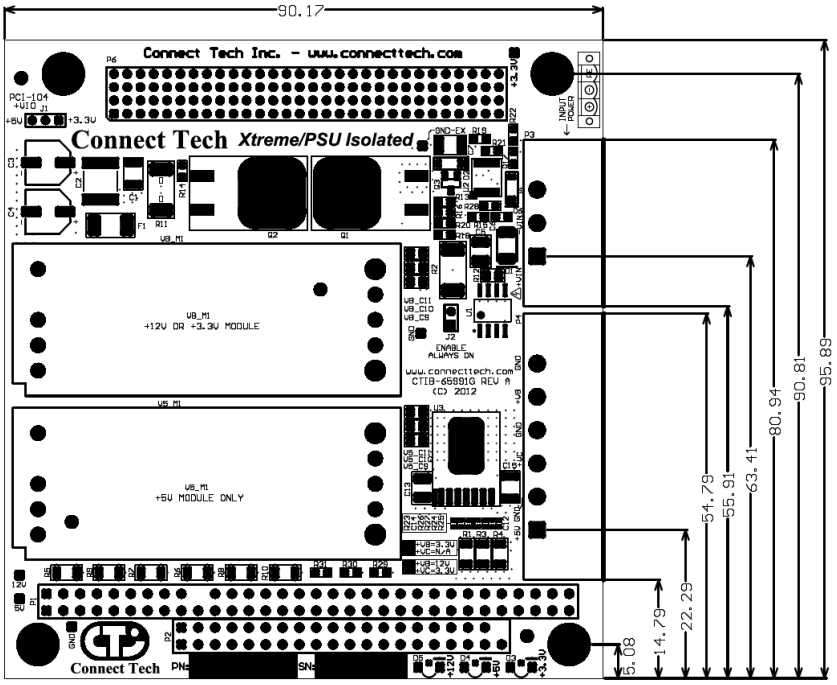
Below is a capture of the 3 output rails after once power has been applied (or the power switch is toggled). Notice that all power rails on the PXG will be stabilized at approximately 20ms after input power is applied.



Dimensioned Drawings

Download 3D Step Model Files Here:
http://www.connecttech.com/ftp/3d_models/PXG00X_3D_MODEL.zip

Dimensions in Millimeters



Dimensions in Inches